

Dissertationes Forestales 85

Owner-driven decision support
in holding-specific forest planning

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Academic dissertation

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Socio-economic and demographic changes among family forest owners and demands for versatile forestry decision aid motivated this study, which sought grounds for owner-driven forest planning. Finnish family forest owners' forest-related decision making was analyzed in two interview-based qualitative studies, the main findings of which were surveyed quantitatively. Thereafter, a scheme for adaptively mixing methods in individually tailored decision support processes was constructed.

The first study assessed owners' decision-making strategies by examining varying levels of the sharing of decision-making power and the desire to learn. Five decision-making modes – trusting, learning, managing, pondering, and decisive – were discerned and discussed against conformable decision-aid approaches. The second study conceptualized smooth communication and assessed emotional, practical, and institutional boosters of and barriers to such smoothness in communicative decision support. The results emphasize the roles of trust, comprehension, and contextual services in owners' communicative decision making.

In the third study, a questionnaire tool to measure owners' attitudes towards communicative planning was constructed by using trusting, learning, and decisive dimensions. Through a multivariate analysis of survey data, three owner groups were identified as fusions of the original decision-making modes: trusting learners (53%), decisive learners (27%), and decisive managers (20%). Differently weighted communicative services are recommended for these compound wishes.

The findings of the studies above were synthesized in a form of adaptive decision analysis (ADA), which allows and encourages the decision-maker (owner) to make deliberate choices concerning the phases of a decision aid (planning) process. The ADA model relies on adaptability and feedback management, which foster smooth communication with the owner and (inter-)organizational learning of the planning institution(s).

The summarized results indicate that recognizing the communication-related amenity values of family forest owners may be crucial in developing planning and extension services. It is therefore recommended that owners, root-level planners, consultation professionals, and pragmatic researchers collaboratively continue to seek stable change.

Keywords: communication, decision making, Finland, forest management planning, learning, NIPF

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Tiivistelmä: Metsänomistajavetoinen päätöstuki tilakohtaisessa metsäsuunnittelussa

Yksityismetsänomistajien rakennemuutos sekä omistajien moniarvoistumiseen liittyvä päätöstukimenetelmien kehittämistarve motivoivat tätä tutkimusta, jossa etsittiin lähtökohtia metsänomistajavetoiselle metsäsuunnittelulle. Suomalaisten yksityismetsänomistajien omaan metsään liittyvää päätöksentekoa analysoitiin kahden haastatteluaineistoon (n=30) perustuvan laadullisen tutkimuksen avulla. Näiden päätuloksia täsmennettiin kvantitatiivisesti analysoidulla postikyselyllä (n=676). Lopuksi rakennettiin sopeutuvan päätöstuen malli, jonka avulla metsäsuunnittelussa voidaan yhdistää erityyppisiä päätöstuen menetelmiä sekä yksilöllistää metsänomistajille tarjottavia palveluja omistajien toiveiden ja mieltymysten mukaisesti.

Ensimmäinen haastattelututkimus syvenyi metsänomistajien päätöksentekotapoihin erittelemällä omistajan oppimishalua ja päätösvalan jakamista metsäammattilaisen kanssa. Tutkimuksessa tunnistettiin ja kuvailtiin viisi päätöksentekotapaa: luottava, oppiva, liikkeenjohdollinen, puntariva ja omaehtoinen. Päätelmissä kullekin päätöksentekotavalle muotoiltiin yhteensopiva suunnitteluote. Toinen samaan aineistoon pohjautuva haastattelututkimus käsitteellisti sujuvan kommunikaation sekä eritteli tällaista vuorovaikutusta edistäviä ja estäviä tekijöitä metsänomistajien päätöstyössä. Analyysi käsitteli emotionaalisia, institutionaalisia ja käytännöllisiä näkökohtia. Tulokset korostavat luottamuksen rakentamisen, ymmärryksen varmistamisen sekä palvelujen kontekstuaalisuuden merkitystä metsänomistajien vuorovaikutteisessa päätöstyössä.

Kolmannessa osatutkimuksessa rakennettiin 14 väittämästä koostuva kyselymittari metsänomistajien päätöstukiodotusten luonteen luokitteluun varten. Mittari koostui luottamuksen, oppimishalun ja omaehtoisuuden ulottuvuuksista. Postikyselyaineiston monimuuttuja-analyysin avulla tunnistettiin kolme vuorovaikutusmieltymyksiin pohjautuvaa metsänomistajaryhmää: luottaja-oppijat (53%), omaehtoiset oppijat (27%) ja omaehtoiset päättäjät (20%). Näille omistajaryhmille suositellaan vuorovaikutustavoiltaan erilaisten palvelujen tarjoamista.

Yllä kuvattujen tutkimusten tulokset tiivistettiin neljännessä osatutkimuksessa sopeutuvan päätöstukipalvelun muotoon. Sopeutuva päätöstukipalvelu mahdollistaa päätöksentekijän (metsänomistajan) tietoiset päätökset koskien päätöstuen (metsäsuunnittelun) prosessin etenemistä. Esitetty malli rakentuu mukautuvuuden ja palautteen hyödyntämisen varaan. Siinä hyödynnetään sujuvaa kommunikaatiota metsänomistajan kanssa sekä oppimista organisaatioissa ja organisaatioiden välillä.

Tulosten yhteenveto osoittaa, että kommunikaatioon liittyvien metsänomistajien asiakasarvojen tunnistaminen on tähdellistä, kun kehitetään metsäsuunnittelua ja muita metsänomistajien palveluja. On suositeltavaa, että metsäsuunnittelun palvelujen kehittämistä jatketaan yhteistoiminnassa metsänomistajien, metsäsuunnittelijoiden, asiakaspalvelun asiantuntijoiden ja tutkijoiden kesken.

Asiasanat: metsätalouden suunnittelu, oppiminen, päätöksenteko, Suomi, viestintä, yksityismetsänomistajat

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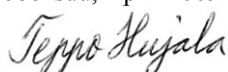
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Joensuu, April 2009



Teppo Hujala

LIST OF ORIGINAL ARTICLES

The dissertation at hand consists of this summary and the following four studies, referred to in the text by the Roman numerals I–IV. The articles I, II, and IV are reprinted with the kind permission of the publishers while the study III is the author version of the submitted manuscript.

- I Hujala, T., Pykäläinen, J. & Tikkanen, J. 2007. **Decision making among Finnish non-industrial private forest owners: The role of professional opinion and desire to learn.** Scandinavian Journal of Forest Research 22(5): 454–463.
<http://dx.doi.org/doi:10.1080/02827580701395434>

- II Hujala, T. & Tikkanen, J. 2008. **Boosters of and barriers to smooth communication in family forest owners' decision making.** Scandinavian Journal of Forest Research 23(5): 466–477.
<http://dx.doi.org/10.1080/02827580802334209>

- III Hujala, T., Tikkanen, J., Hänninen, H. & Virkkula, O. 2008. **Family forest owners' perception towards decision support.** Manuscript.

- IV Leskinen, P., Hujala, T., Tikkanen, J., Kainulainen, T., Kangas, A., Kurttila, M., Pykäläinen, J. & Leskinen, L.A. 2009. **Adaptive decision analysis in forest management planning.** Forest Science 55(2): 95–108.
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Mr. Teppo Hujala was the primary designer of the research interviews (I, II) and the postal survey (III). He conducted the interviews and their analyses for articles I and II. He analyzed the survey data for study III and was the main author of studies I–III. For article IV he constructed the optional process alternatives for the general framework and the scheme for their adaptive use in forest planning, including illustrations and a practical example.

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INTRODUCTION

Societal demands challenging forest policies and forestry practices

Ecological, economic, and social change behind transnational policies

In general, forest policies can be promoted by means of regulations and taxes, subsidies, and communication, also referred to as sticks, carrots and sermons (Bemelmans-Videc et al. 1998, Serbruyns & Luyssaert 2006). Conventionally, national applications of these policy instruments have been based primarily on the particular conditions of each country. Over the past two decades, however, international forest and environmental declarations and agreements (e.g. United Nations 1992, Second Ministerial Conference... 1993, Convention on Biological Diversity... 2004) have compelled nations to harmonize their national policy agendas (Parviainen & Frank 2003). This harmonization has been implemented on the European level by defining Pan-European criteria, indicators, and operational guidelines for sustainable forest management (Third Ministerial Conference... 1998), for example, and by co-developing the concept and practice of the national forest programme (Glück & Humphreys 2002, Buttoud et al. 2004). As a consequence, enhancing forest policy instruments has increasingly developed towards a transnational endeavor shaped and adjusted nationally.

Alongside policies, extensive ecological and socio-economic issues, such as climate change mitigation (Canadell & Raupach 2008) and societal modernization (Inglehart 1990), have raised challenges for current forestry practices. In non-industrial private forestry (referred to in this summary as family forestry (cf. Harrison et al. 2002, Wiseman 2003)), features of urbanization, economic progress, and the changing meanings of forests exist concurrently with parcelization (Zhang et al. 2005) as well as with the ageing and anticipation of a remarkable demographic change (cf. Butler & Leatherberry 2004, Ziegenspeck et al. 2004, Inglehart & Weltzel 2005). On the other hand, economic globalization (e.g. structural readjustment in the global economy (Dicken 2003, McDonald et al. 2008)) and the new public management (Christensen & Laegreid 2002, Pollitt et al. 2007) have raised stronger demands for better cost-efficiency and more transparent effectiveness of policy instruments, such as the Finnish forest planning system (Greis 2007, Maa- ja metsätalousministeriön metsävaratiedon... 2008). In turn, greater quality consciousness challenges communicative soft policy tools (i.e. written information, online services and face-to-face advising), which nowadays seek customer-drivenness to better serve the diverse motivations of family forest owners.

Role of forest planning and advising under changing circumstances

Forest plans (booklets comprising summary information of the holding, maps, and standwise suggestions for forestry operations), which belong to the sermon category of policy tools, have traditionally been sold to family forest owners in order to encourage them to commit to timber production and self-active management, and in order to catalyze private investments (Ollonqvist 2001). Recently, the preservation of biodiversity has been added to the justification of plans as policy tools, along with the general aim of ensuring

sustainable wood production (Ingemarson 2004, Hujala et al. 2008). This has placed landscape ecology and owners' collaboration on the agendas of research and methodological development (Jacobson 2002, Kurttila & Pukkala 2003, Rickenbach et al. 2004, Kittredge 2005, Martins & Borges 2007). Both landscape ecology and collaboration issues shape and modernize the meaning of forest planning and related extension.

Simultaneously, a culturally rather homogeneous forest owner crowd of farmers has been replaced by diverse owners with varying lifestyles and motivations regarding their forests (Wiersum et al. 2005). Therefore the focus of inquiry has shifted from the forest plan as a purely technical document towards the design and implementation of communicative learning services (i.e. planning as collaboration, extension, advising, counseling, guidance or assistance) (cf. Snyder & Broderick 1992, Kendra & Hull 2005, Van Gossum et al. 2005, Salmon et al. 2006). The communicative approach in planning (see also Sager 1994, Healey 2006) presumably offers opportunities for identifying the value orientations of the participants, tailoring the services for each owner, negotiating more complicated issues, and ensuring owners' learning outcomes (cf. Kuhns et al. 1998, Tikkanen 1998). Communicative holding-specific forest planning may strive for empowerment (Jones et al. 2001) by utilizing a social learning approach (Keen et al. 2005, Keen & Mahanty 2006) as well as sophisticated communication skills (Hargie 2006a&b). Obviously, feedback before, during, and after decision aid services is a fundamental part of applying the communicative approach.

Past and present studies of family forest owners

The behavior of family forest owners has been the subject of much study in past decades, most intensively in the Nordic Countries (Finland, Denmark, Norway, and Sweden) (e.g. Karppinen et al. 2002, Boon et al. 2004, Bolkesjø et al. 2006, Ingemarson et al. 2006) and in North America (cf. Butler & Leatherberry 2004). In recent years, Swiss, Austrian, and Belgian owners have also been the subject of thorough study (e.g. Kvarda 2004, Wild-Eck et al. 2006, Van Herzele & Van Gossum 2008), with a particular interest in the new urban generation of forest owners.

Research papers that aim to support family forestry policy usually group owners empirically and combine this knowledge with timber supply (cf. Karppinen 2004). Alternatively, econometric models have been constructed to forecast the behavior of owners (cf. Beach et al. 2005). Monitoring and forecasting changes in owners' socio-economic structure, values and motivations (e.g. Ripatti & Järveläinen 1997, Karppinen & Hänninen 2006, Rämö & Tili 2007) is a research perspective of growing importance.

Because researchers find that classic universal socio-psychological value theories (e.g. Schwartz 1992) fail to grasp the particularities of family forest ownership (Karppinen 2004), empirical owner typologies have been created contextually in each country by conceptualizing values, attitudes, motivations, and/or objectives from different perspectives. Because of different theoretical approaches and differing contexts, international comparison of these typologies has thus far been impractical. Similarities do exist, however, and transferable inferences can be drawn that relate to, for example, urbanization, passivity, amenity-driven motives, or recreational values.

In Finland during 1970s family forestry was, through a factor analytic survey, interpreted as mentally motivated by preference for a subsistence economy, attachment to land, resistance to change, and traditionalism (Hahtola 1973). Under these same

circumstances, Järveläinen (1974) studied owners' actual behavior, followed a decade later by Järveläinen and Karppinen (1984), who focused on owners' training and advisory issues. In the Missouri Ozarks, in turn, the concept of a decision-making framework was constructed, and an owner's forest management strategy was found to stem from motivations, objectives, and constraints (Lewis 1979, Kurtz & Lewis 1981). Through the Q-sort technique (Stephenson 1953), timber agriculturalists, timber conservationists, forest environmentalists, and range pragmatists were distinguished as owner types for which different communication programs were recommended (Marty et al. 1988). Kuuluvainen et al. (1996) and Karppinen (1998) later constructed an empirical owner typology (multi-objective owners, recreationists, self-employed owners, and investors) that was built upon basic value orientations towards forests: utilism (materialism), humanism, mysticism, and primitivism (naturalism) (Pietarinen 1987).

Focusing on decision making more directly, Lönnstedt and Törnqvist (1990) examined the decision situations of Swedish family forest owners. In this study, decision options and goal structures were approached on a materialistic level with no direct link to deeper values. The study did, however, yield a model of factors affecting forestry behavior, which was later enhanced and used in comprehensive studies of Finnish family forest owners' values (Karppinen 2000, 31).

Törnqvist (1992) investigated Swedish family forest owners' contact networks. A contact network is undoubtedly an essential part of an owner's decision making environment, a concept that is clearly linked to the decision-making framework of Kurtz and Lewis (1981), introduced above. The Swedish case (Törnqvist 1992) revealed four different fields as owners' contact areas: association (cooperation), market, authority, and information. A further comprehensive sociological picture of Swedish private forest ownership (Törnqvist 1995) tied together the factors that affect family forest owners' modes of action: Swedish ownership at that time typically resembled a family business with commonality between generations, an ideal of enterprise and a special sense of social identity.

Some other interesting approaches in family forest owner research have thus far been applied in Wisconsin, USA, and in Uppland, Sweden. In the former North American case (Bliss & Martin 1989), survey and qualitative methodologies were compared analytically for a study of family forest owners' management motivations. Similar to the results of Törnqvist (1995) above, the study found that forest ownership and management contributes to the whole identity of a forest owner (ethnicity, family and personal identity); interestingly, some of the interviewees were Americans of Finnish immigrant origin. The latter Swedish case (Lönnstedt 1997) approached the decision process of family forest owners from a business economic perspective, focusing on the owners' managerial ways of thinking. The overriding objective observed in this study was preservation and development of the property, which indicates a long time horizon. These reasoning patterns on both sides of the Atlantic Ocean are evidently associated with multiple values, trans-generational views, and the intrinsic value of ownership (cf. Rämö & Tilli 2007, Hujala et al. 2008), results also found in previous studies by Hahtola (1973) and Marty et al. (1988).

In recent years, Finnish family forest owners' communication motivations were studied in the context of forest planning through qualitative interviews (Isokääntä & Tikkanen 2003). The study distinguished multi-objective learners, multi-objective influential (i.e. decisive) owners and profit-seeking trusting owners as planning customer types that call for various communicative services. At the same time, Swedish small-scale forest owners' motivations and objectives were in turn investigated qualitatively based on culture-centered

theoretical modeling (Hugosson & Ingemarson 2004). Analysis of the interview transcripts led to the formation of a typology of motivations for small-scale forest owners: utilities, amenities, conservation, and economic efficiency. Later on, the qualitatively found patterns were successfully validated by quantitative survey data and a cluster analysis aiming to support forest policy (Ingemarson et al. 2006).

The owner typology of Ingemarson et al. (2006), together with its contemporaries from other European countries (e.g. Boon et al. 2004, Høgl et al. 2005) as well as related North-American landowner studies (e.g. Elwood et al. 2003, Rickenbach et al. 2005, Salmon et al. 2006), acknowledges new, urban, and passive owners as particularly important segments when developing planning and extension practices. There is good reason to assume better effectiveness for policies when instruments are conformable to the stakeholders' values and beliefs (Schneider & Ingram 1990). Although research (Kendra & Hull 2005) indicates that lifestyle and amenity issues are important motivations for owners, little emphasis has thus far been placed on sources of owners' emotional utilities and pleasure when constructing owner segmentations for appealing communicative services.

OBJECTIVES

This thesis approaches family forest owners' decision making from the viewpoints of social and cognitive concepts of reasoning. The study aims to examine the phenomena relating to owners' varying decision making strategies. The occurring perceptions of available communicative decision support will be investigated in depth with an emphasis on owners' decisiveness, learning, and trust. The analyses of different datasets will help to devise grounds for owner-driven and adaptive decision support for family forestry. Though analyzing the Finnish case, the aim is to render the conceptual findings and recommendations internationally transferable to other modernizing countries where consultation for family forest ownership occurs through advisory, training, or extension services.

The more detailed research questions of this thesis are:

- What kinds of decision-making modes can be observed among forest owners by paying attention to the sharing of decision power and the desire to learn, and what are the implications of such modes on the needs for decision aid? (I)
- How do family forest owners experience and use various communication options, including existing social relationships and mediated interaction, in their decision-making processes? (II)
- Which are the main phenomena involved in forest planning interaction that limit (e.g. incomprehension) and contribute to (e.g. trust) communication as constructive help in owners' decision making? (II)
- How do decision-support attitudes combine in owners to form an owner typology, and what kinds of communicative services may suit the different owner types? (III)
- What kinds of connections (if any) can be found between owners' background characteristics and communication preferences? (III)
- How could the serving of different decision aid needs be organized into a unified but flexible scheme that would include adaptability and enable learning at various levels? (IV)

STUDY CONTEXT AND KEY CONCEPTS

Holding-specific forest planning in Finland

Forest planning for family forest holdings in Finland has thus far been conducted within regional standwise field inventory. This way of working has its roots in the 1960s (Nuutinen 2006, Hokajärvi et al. 2007a), and, although it has not succeeded everywhere due to scarce resources, aims for all family forests in each village to be gone through and the forest resource data to be updated every 10–15 years. In the course of the field work, holding-specific forest plans have been marketed and sold to forest owners, typically in collaboration between statutory regional forestry centres and forest management associations (Hokajärvi et al. 2007b).

Through forest plans, which include recommended standwise treatments for a ten-year period, sustainable wood production and standardized ideas of good silviculture have been promoted. The plan itself (a booklet and, nowadays, the same information in electronic form) and related advising have been regarded as effective policy instruments from the perspective of normative policy, which aims to influence owners' behavior (Ozbekhan 1969, Paananen 2002, Finland's National Forest Programme 2010 & 2015). This is why the State has subsidized the costs of such plans, which have been voluntary for ordinary family forest owners. Consequently, despite subsidies and active marketing, only a share of forest owners have bought the plan: 62% of private forest land was covered by and 48% of owners had a valid (i.e. less than 15 years old) holding-specific plan in 1999 (Karppinen et al. 2002). More recent but less representative studies by Rämö et al. (2005) and Rämö and Tilli (2007) recorded the shares of valid-plan-owners, respectively, as 53% and 67%.

In these circumstances, both the effectiveness of plans as policy tools and the value of forest planning for owners' true decision aid needs have been questioned (Kangas & Hänninen 2003). However, recent research (Niskanen 2005) has shown that the effectiveness of planning (i.e. conducted forestry operations) stems mainly from freshly available standwise forest data. Such is the case in the Finnish system, since forest data are available for forestry professionals in forestry organizations; whether an owner actually buys a forest plan seems to have little effect as such on harvesting or silvicultural treatments.

The first decade after the Millennium has brought notable change pressures to the Finnish forest planning system. Finland's National Forest Programme 2015 (p. 17) states that because of structural changes among family forest owners, the objectives of forest ownership will diversify and the role of forests as a source of income will decrease. The programme also anticipates ageing and the growing share of female and distant owners (urban dwellers), to whom advice, education, and the marketing of forest management services in particular should be directed. The programme emphasizes a customer-oriented approach in providing services and products for forest owners (Finland's National Forest Programme 2015, 39). This approach is presumed to increase the overall utility of forests to society. This policy objective enjoys the support of the Ministerial strategy for forest resource data and forest planning 2008–2015 (Maa- ja metsätalousministeriön metsävaratiedon... 2008, 5), which aims to provide good quality forest data as well as owner-oriented and multi-objective planning with efficient and effective methods.

At the moment, the Finnish forest planning system is being modernized so that the regional field inventories will be replaced by the remote-sensing-based updating of forest resource data and field checks every third or fourth year (Store 2007). This system is expected to free up the time professional planners spend conducting field measurements. The aim is thus to communicate with forest owners more. Besides, the availability of always fresh forest resource data will make it possible to create plans and to offer communicative planning services on-demand more flexibly than is possible today (Greis 2007).

Learning approach for contextual and boundedly rational reasoning

This thesis presumes that in making forestry decisions, family forest owners follow certain decision rules – heuristic rules of thumb – developed adaptively based on owners' previous experiences as well as existing attitudes and goals (see also Hahtola 1973, 17–18). Routines and social norms play an important role in such habitual problem solving (Katona 1953, 309–311). A behavioral tendency toward confirmation bias (Wason 1960) (i.e. to subconsciously seek confirmation for preconceptions) and status quo bias (Kahneman et al. 1991) (i.e. to routinely favor things as they have been) presumably disturb these mental processes, along with other behavioral patterns (von Winterfeldt & Edwards 1986). Moreover, values, norms, and experiences strongly influence what owners think about advisors, forestry organizations and, for example, planning. These perceptions can be referred to as social and cultural representations (Jovchelovitch 2007, 10–35) of potential advisors and advisory institutions. Thus, rather than as purely cognitive routines, following decision rules and creating new ones is seen here as a culturally and socially mediated learning activity. The outcome of personal-historical and situational factors can be summarized as the decision-making context, which for its part affects the perceived utilities of available options (Vlaev 2007) and thus the occurring perception of decision support.

In the reasoning process, decision alternatives are examined and considered with respect to possible outcomes. These consequences are judged either sufficient or insufficient. Some theorists explain the reasoning with a maximizing strategy whereas others, in contrast, argue for a satisfying strategy (Cyert & March 1963, March 1994). Regardless of the answer for that debate, the limitations of practical decision making evidently bound the idealistic rational choice (Simon 1955, 1957, 1979, 1982, 1997). Thus a forest owner must simplify the decision situation in his/her thinking due to the complexity of multi-objective tasks, which family forestry decisions typically are like. Hence, not all decision alternatives are conceived simultaneously, and not all consequences of them are considered at all, which results in sequential and selective attention (Festinger 1957). Here a forestry professional bears a great responsibility to avoid leading the discussion too strongly towards issues irrelevant to the owner. Ideally, this responsibility can be practiced by listening to the owner and applying adaptively flexible service schemes.

Figure 1 shows a simplified conceptual model of the initial driving concepts of this thesis. Contextual and situational awareness of the owner's case is combined with recognizing boundedly rational decision making through responsibility and adaptability in order to generate a meaningful communicative process as a basis for new generation planning services. Responsibility here means that when advising the owner, the decision consultant takes into account the decision context and the owner's situation as well as the limits of rationality. Adaptability in turn means the flexibility and sensitivity to make each

planning case unique and thus meaningful for the owner as the decision-maker. Adaptability is a joint task between the owner and the planner: beginning from a certain common ground (cf. Clark & Schaefer 1989, Clark & Brennan 1991) and developing it collaboratively is a feature of an ideal decision aid service. The overall approach in this thesis is descriptive with regard to owners' decision problems and decision support needs, and normative with regard to the development of decision support services. In other words, owners' perceptions are investigated and described, and it is thereafter argued that the decision aid services are to be adapted to the distinguished situations. This principle is deliberately in line with owner-drivenness described in more detail below.

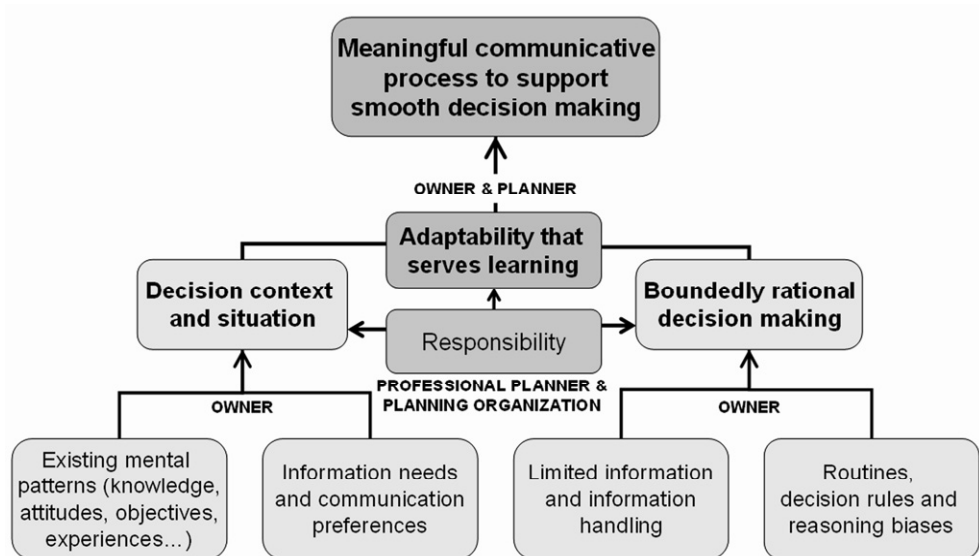


Figure 1. Driving concepts of this thesis, relating to decision making, adaptability, and learning.

The role of learning in family forest owners' decision making certainly varies between owners and decisions. Whether the learning is an owner's motivation as such or only a tool to achieve some other goal (e.g. earn money from the forest), the decision support service (i.e. planning) must be arranged in a manner that serves learning. At the very least, such learning involves getting to know and to accept or reject the professional suggestion. In its more mature form, learning means understanding the possibilities of the holding (meaning not only wood production but other ecosystem services (Daily 1997) as well) and clarifying the owner's own objectives to help manage with self-reliant decisions.

The highest level of learning includes knowing the principles of sustainable forestry and silviculture, and gaining the ability to solve decision problems applicable to the objectives. Indeed, forestry decision support can be compared with facilitating the owner to climb up the stairs of SOLO (Structure of Observed Learning Outcomes) taxonomy (Biggs & Collis 1982). To form a conceptual definition, an adaptive consultant (i.e. a good professional planner) is able to learn about the owner's case and select "the appropriate stair and the proper sized steps" within the owner's zone of proximal development (ZPD) (Vygotsky 1978). In the forest planning case, the forest owner's ZPD can be interpreted as a level of discussion and illustration that is sufficiently informative and meaningful to enable the owner's learning, but not so complicated that it ruins the learning experience.

Owner-drivenness in decision support services

From a forest owner's point of view, holding-specific forest planning is reasonable when it aims to ensure that owners' objectives for ownership are as likely as possible to come true (Kangas et al. 2008, 4). In other words, forest planning is considered useful if it contributes to better decisions than would be possible without it. The core of planning is therefore to support good decisions. An important feature of the appropriateness of planning is the value of information, which can be approached by, for example, cost-plus-loss analysis (Hamilton 1970 & 1978; Duvemo & Lämås 2006). This approach takes into account not only the loss of the worse, uninformed decision, but also the cost of the better, informed decision, and determines the overall value of additional information. For concrete measurements, calculations, and actions, the evaluation is rather simple, but the overall value of planning, including communication and learning, is far more complex. The perceived utility of social interaction with the planner-advisor and the long-term effects of learning through communication have no pre-determinable price tags. Hence, asking openly for an owner's wishes (e.g. Tikkanen et al. 2006) and listening to his/her desires for communication (Salmon et al. 2006) play an important role in learning about the owner's emotional and social utilities, which are essential components of the value of planning, along with the value of technical forest information.

A forest planning process in the current Finnish system includes several phases: the marketing of plans, a discussion about the owner's objectives, a joint field trip by the owner and the planner, communication while calculating and compiling the final plan, and delivering the plan as well as guiding its implementation (see also Isokääntä & Tikkanen 2003, Nuutinen 2006, Hokajärvi et al. 2007b). This thesis argues that in owner-driven planning, the objectives of the process as well as the phases and methods applied fit together with the owner's decision-making context, decision-making strategies and decision problems at hand.

One could also argue that a genuinely owner-driven process would be initiated by the owner. In practice, such owner-drivenness can perhaps be promoted by suggesting distinct but flexible alternatives for whole services and various methods as components of those services. The owner's task would then be to become aware of these alternatives and to take the initiative should a need for service arise. It is worth noting that owner-drivenness, as described in this thesis, grants the owner the power to drive the communicative process (i.e. make choices concerning the phases of the planning and the types of communication as well as the topics to discuss). The owner should perceive forest-planning-related communication as a flexible and meaningful decision-support that is conformable to his/her objectives; with this aid, s/he can learn to make good decisions more comfortably than before in order to achieve from forest ownership the desired utilities.

View of social sustainability on institutional change

In addition to contributing to ecological and economic sustainability, the new setting for forest planning services should appreciate the modes of life and collective socio-cultural motives of family forest owners (Rudqvist & Törnqvist 1986) to maintain and strengthen the social dimension of sustainability. The notion of social sustainability can be defined in a number of ways, all however originating from the Bruntland Commission's definition for sustainable development in "Our Common Future" (Bruntland 1987). Some of them are tailored for use in forestry field and rural development (e.g. Gow 1988, Hytönen 1988, Juurola & Karppinen 2003, Leskinen et al. 2006).

The approach applied in the present study rests on the perspective of Machlis and Force (1988, 222–225), who apply the concept of community stability. The same viewpoint is evident in the definition offered by Munro (1995) and used by Upton and Bass (1995, 14): *"Social sustainability reflects the relationship between development and social norms. An activity is socially sustainable if it conforms to social norms or does not stretch them beyond a community's tolerance for change."* Rannikko (1999, 399) communicates a similar approach from a more dynamic perspective by adopting Kaufman & Kaufman's definition (1990, 32–34): *"To cope with new circumstances communities must gradually change. The changes may not, however, go beyond a certain limit, the changes may not be too many nor may they be too fast or dramatic. The changes must be ones that individuals can bear and be able to adapt to."* This can be seen as a social-learning interpretation of the Vygotskian concept of ZPD introduced above.

Consequently, the developers of forestry communication and extension practices should determine both the tensions that call for expansion and the limits that restrict the expansion. In this endeavor, both forest owners' and forest planners' abilities to adopt new forms of communicative decision support should be taken into account. The institutional and practical modifications, evoked by societal demands and changes in circumstances, should be effective but not too radical in order to foster perceived legitimacy and the commitment of actors (see also Schneider & Ingram 1990). Developmental actions should thus be based on the cultural-historical understanding of the present state and on the observed tensions in current practices (Engeström 1987). Expansive learning (Engeström 2001) includes an institutional scale, but simultaneously appreciates the actors' points of view, which renders it socially sustainable by definition. This thesis focuses on the owners' perspective only; overall conclusions concerning the development of communicative forest planning will also require parallel analyses from planners' and other actors' viewpoints.

DATA AND METHODS

Qualitative interviews with family forest owners (I, II)

Articles I and II are based on rich qualitative interview data collected in August and September 2005. The interviewees were selected from among those Finnish family forest owners who had ordered a forest plan from the Regional Forestry Centre of Pirkanmaa (Tampere region) or North Karelia (Joensuu region). The sampling method was purposive sampling for heterogeneity (Patton 2002, 234–235; Silverman 2005, 129–130), meaning the subjective selection of owners of various backgrounds. The interviewee candidates for articles I and II were selected subjectively by regional planning professionals. The stratified purposeful sampling aimed to facilitate comparisons (Wengraf 2001, 102). The objective was to observe variety in owners' decision-making circumstances and thus their decision-making strategies. To compromise between this aim and the resources available, the number of interviewees totaled 30, which is comparable to that of other qualitative studies on family forest owners (e.g. 40 in Rudqvist & Törnqvist 1986, 35 in Lönnstedt 1997, and 22 in Rickenbach et al. 2005). Details of the selected owner crowd appear in articles I (p. 457) and II (p. 468).

The interview guide for the semi-structured research interviews (I, 463) was compiled with the aid of examples by Lönnstedt (1997) and Isokääntä & Tikkanen (2003) and a focus on decisions concerning the use of owner's forests. Both the tone of considerations relating to forestry decisions and the role of social interaction in forestry decision making were emphasized. The guide was adjusted towards practical relevance through consultation with the Forestry Development Centre Tapio at a meeting on the objectives of the study.

The author of this thesis conducted the interviews, which lasted from 17 to 86 minutes (average 63 min), and transcribed them word for word. Preliminary observations and interpretations were made in these phases before initiating the in-depth analysis for articles I and II. To analyze the data, an adaptive theory approach (Layder 1998) was applied. Adaptive reasoning involves the interplay between theory- and data-driven approaches such that theoretical preconceptions (i.e. draft theory) constitute the perspective from which the phenomena in question are observed further and the draft theory is improved. In other words, the method in general involved theory-mediated observation through semi-organized retrospectives.

The draft theory of article I comprised the changing role of learning in owners' decision making, while the draft theory of article II consisted of the essence of trust in owners' perception of decision aid. These particular analyses comprised different sets of detailed phases (cf. Miles & Huberman 1984; Kvale 1996, 196–199; Creswell 2003, 191–195), described in more detail in articles I (p. 457) and II (p. 469). The analyses were conducted with NVivo 7 (Richards 2005, Bazeley 2007), a popular Australian software designated for coding, condensing, querying and representing qualitative research data.

Postal survey for family forest owners (III)

Study III was based on the quantitative responses of 676 family forest owners from four districts in Finland (III, 73). For the survey, a random sample of 1600 owners was drawn. The core of the survey was to construct a psychological measurement tool (Gulliksen 1987) to assess owners' levels of trusting, learning, and decisive attitudes towards decision support, as observed previously by Isokääntä and Tikkanen (2003). The questions and the factor analysis were tested in the context of the 30 research interviews for articles I and II, and an improved version was used in the postal survey (III, 71–72).

The survey was sent and responses received between October 2006 and January 2007. The response rate was 42.2%, and the distribution of respondents showed only small discrepancies in comparison with the best available reference data (III, 74). In order to answer the research questions for paper III, the Likert-scale responses for statements regarding owners' decision making were assessed with standard multivariate statistics (Anderson 2003). A sequence of rotated factor analyses was tested to select a three-factor solution for 14 statements, and the factor scores served to cluster the owners into three groups. Any differences between the groups were analyzed with respect to cluster centers in each factor dimension as well as to group members' background characteristics (III, 77–81). The findings were discussed from the viewpoints of service providers and family forestry policy-makers (III, 83–86).

Conceptualizing adaptive planning (IV)

One of the aims of article IV was to apply mixed-methods thinking (Tashakkori & Teddlie 1998, Tashakkori & Creswell 2007) and to bind together the findings of studies I, II, and III with relevant quantitative methods of decision analysis. A multidisciplinary conceptual scheme for adaptive planning was constructed as the basis, (IV, 97), beginning with the ideas of adaptive learning by Alterman (1988) and involving computational learning (Kearns & Vazirani 1994), individual/social learning (Bandura 1977), and organizational learning (Argyris & Schön 1978) with the essence of feedback management.

Further, the methods of communicative and calculative forest planning as well as different consultation approaches against different learning styles were reviewed (Blake & Mouton 1983, Cockman et al. 1999, Kolb et al. 2000, Pukkala 2002, Kangas & Kangas 2005, Pykäläinen et al. 2006, Martins & Borges 2007, Kangas et al. 2008, Kainulainen et al. 2009). After that, the usefulness of those methods in context of holding-specific forest planning was theorized with respect to the different decision problems, decision-making modes and decision aid amenities that were observed in studies I, II and III. Illustrations of conceptualizations were generated as results.

RESULTS

Roles of trust, learning, and decisiveness in owners' attitudes

Article I confirmed the owners' trusting, learning, and decisive views of decision support, observed earlier by Isokääntä and Tikkanen (2003). The innovation in article I, essentially reflected in the analysis of study III, was the idea that an owner may use different decision-making modes in different types of decision problems, although s/he may simultaneously represent one single person-specific owner type. Analysis of interviews yielded five different decision-making modes: learning, trusting, decisive, managing, and pondering (I, 458–459). These modes can be seen as alternative socio-cognitive orientations towards the decision problem at hand.

The varying role of learning in owners' desires was a straightforward and expected outcome in article I, whereas rather strong signs of outsourcing and tendencies toward self-reliance in interviewees' decision-making strategies helped to enhance the draft theory. As a conceptualization of these observed phenomena, dimensions of the desire to learn and the sharing of decision power were thus constructed and placed orthogonally in a single diagram. The observed modes were then placed in the figure with conformable types of decision-support approaches (I, Fig. 3, p. 460). Moreover, the decision-making modes were assessed in terms of stability versus dynamicity, and the requirements of different modes for forest planning service providers were discussed (I, Fig. 2, p. 459–460). It was devised that whereas some owners may appreciate simple numerical facts from planning, others desire either hands-on guidance or conceptual pondering assistance. This diverse variation is evidently a concrete challenge for owner-drivenness. These approaches affected the further conceptualization of different decision-support service types, presented in study IV (p. 99).

The draft theory of the role of trust in owners' decision-making routines evolved in the analysis of the interviews for article II (p. 469), and further in the aggregate owner groups in study III (p. 77). The study found that, along with the current state of owners' forestry knowledge, the interplay between trust and decisiveness (i.e. trust in oneself rather than in an expert) is mediated by the perceived legitimacy of the advisor's organization (II, 469–470). Besides, the aggregate clusters of owners, based on the survey data (III, 83–84), showed that blind trust in its pure form does not exist, which was interpreted as “decisiveness on outsourcing” (i.e. the deliberate sharing of decision power). Simultaneously, the grouping data showed that the desire to learn was associated with 80% of owners, which justifies the presumption of learning as an important issue in developing communicative decision-support services.

The main result of study III was to present how trusting, learning, and decisive attitudes combine in Finnish family forest owners' views of communicative decision support. The three aggregate owner groups distinguished were trusting learners (53%), decisive learners (27%), and decisive managers (20%) (III, 77). The main conclusion, in turn, was that all these compound wishes are sufficiently large to be taken into account when developing communicative decision aid services for family forest owners. In more detail, it appeared that the group of trusting learners included more highly educated distance owners than did the other groups (III, 78–80). The owner's life situation with respect to the forest (in particular, the time available and the distance from residence to holding) seemed to

associate more with the grouping than did the owner's age, for example, or the area of holding. This highlights the role of situational factors as well as the decision-making environment (I, 456) behind an owner's wishes for decision aid. The observation conforms to the results of article II (p. 475), which address the essence of an owner's social identity and decision-making context as determinants of communication preferences. However, the results provide no basis for neglecting the role of personal learning styles (Kolb et al. 2000), which were therefore included in the conceptual model of offering adaptive planning services (IV, 98–100).

Owners' decision making as a social practice

The interview data showed that past advisory experiences, sharing the same local experience with an advisor, and the perceived expertise of a forester contribute to trust and consequently to the sharing of decision power (I, 458 & II, 469–470). The less-experienced owners appreciated the professionalism of a forester, whereas the more experienced owners expressed some reservations about them. In addition to the forest planners of regional forestry centres or the regional advisors of local forest management associations, more experienced peer owners as well as acquaintances and relatives working in the forestry branch were mentioned as trusted advisors (II, 470–472). This indicates that informal situations and owners' social networks are essential in decision-making processes, and developing official services accounts for only a part of it.

The analysis of how owners utilize different communication options showed that owners' decision making is essentially a social practice, which could be fostered by following the devised features of successful communication (II, 474). These recommended features include concrete communicative practices (I, 458) and the promotion of fellowship as well as contextual and flexible services (II, 471–472). Based on these results, it was theorized (II, 475) that an owner's position in the rural–urban continuum is an important feature affecting communication preferences. While the number of distant and semi-rural owners (II, 468) is growing, there is an increasing need for a division of responsibilities between urban consulting (to fit owners' everyday practices by finding suitable times and places) and rural consulting (to offer contextual hands-on guidance). Combining these will also be a future task. The owner-driven character of communication services was recommended to be promoted by offering owners services in a safe and reliable atmosphere, as well as opportunities for informal communication with foresters and peer owners (II, 475).

Institutional and practical challenges for owner-driven decision support

Article II showed (p. 470–471) that illegitimacy, incomprehension, and tension between services and actual needs are the greatest communicative distortions among owners that limit smooth communication. It was concluded that a modern version of customer relations management (Storbacka & Lehtinen 2001) with distinctive but flexible service options could be of help in the latter two distortions (II, 474). However, the illegitimacy and related insincerity perception were considered more demanding, since they cannot be managed solely by means of developing communicative services. Rather, transparent information on applied activities and market mechanisms are needed, which requires organizational

cultures in the forestry branch to concentrate on emphasizing genuine customer care (II, 475). Article IV (p. 99) added the usefulness of emotional intelligence (Goleman 1998) in applying different consultation approaches.

The concept of a decision-support service option (DSO in IV, 96) was created to operationalize the idea of distinct but flexible service alternatives presented in studies I (p. 461), II (p. 475), and III (p. 85). Conceptualization of the results of articles I and II, together with learning styles (Kolb et al. 2000), yielded six decision support service types (IV, 99). Further, six exemplary DSOs were formulated to suit holding-specific forest planning (IV, 99–100). The components of DSOs indicate a diverse set of a forestry consultant's various skill requirements. This challenges the education and training of forest planners, who will need to utilize qualitative goal analysis techniques, for example, preference rating tasks, comparative calculations with different parameters, and continuous feedback management, as required by the adaptive ideal of owner-driven decision aid services.

From the perspective of the owner–consultant relationship, the DSOs described in article IV call for rather different challenges. In some cases, only rather straightforward action-oriented advising is required. This was probably the typical case when forest plans were compiled for experienced and self-active farmers. In contrast, a less straightforward DSO requires the process to deconstruct the owner's existing mental models guiding the activity principles, problem conceptions, and goals (cf. Argyris & Schön 1978). This kind of planning service may take place after notable changes in the owner's decision making environment (e.g. retirement, children, moving from/to the city, etc.). Furthermore, in the most emancipative cases, communication and decision-making principles are exposed to collaborative reconsideration as well. Then the forest owner could intentionally change a consultancy service, share decision-making power in a new manner, etc. This revolutionary type of learning could take place when new forms of activity have entered the owner's decision-making environment.

DISCUSSION

Critical evaluation of methods

The epistemological role of qualitative and mixed methods

The philosophical, theoretical and methodological depth of the mass of forest owner-related research has been questioned through a meta-analysis of 32 landowner studies from 1978 to 2000 (Deane 2004, 52–54). It indicated that landowner research tends to apply simple empirical questionnaires and straightforward reasoning, thus lacking conceptual sophistication, showing strong dualism (separation of the researcher from the observed phenomenon), and emphasizing managerialism over a pluralistic understanding of owners. Similar lines of arguments against too intensively planned intervention (e.g. Havelock & Zlotolow 1995) and for reflexive communication have recently been put forward in the rural-agricultural field as well (Leeuwis 2004).

This thesis aims to rely on constructivist, narrative, and meaning-based ontologies as well as on an interpretivist axiological paradigm, as Deane (2004, 97–98) suggested. Talking in-depth with owners about their ownership and management motivations, and creating interpretative narratives (I, II) are signs of these approaches. Studies III and IV represent serious efforts to conceptualize the findings in a multi-disciplinary form that would show both theoretical sophistication and appreciation of owners' varying motivations. These components are thus far only half complete, since the findings of study III have not yet been widely discussed with owners themselves (e.g. in focus groups). Moreover, an empirical testing of the ADA approach (IV) in practical situations is lacking, which limits the scope of the practical inferences of this thesis.

Thus far, many behavioral family forest owner studies have been based solely on quantitative survey data or on structured telephone interviews, the results of which have been extensive and general. A notable weakness of these approaches, however, is that with quantitative data gathering, one can only obtain information that the researcher has postulated and inquired about. A qualitative study, though lacking statistical significance, can delve deeper and reveal new patterns of phenomena related to people's personal histories or everyday lives (Creswell 2003; Silverman 2005, 6–8). However, qualitative inquiry still bears the problem of socially desirable responses (Paulhus 1984).

In this thesis, articles I and II provide a deeper understanding of family forest owners' decision making, but prove nothing about the frequency of the phenomena revealed. Besides, the responses are the results of situational collaboration between the interviewer and the interviewees. The results are thus inevitably shaped and mediated through practical and scientific discourses, previous experiences, and the interview actors' mutual representations of each other. Rather than as an "objective truth", the results of articles I and II must be considered subjective however systematic interpretations of owners' decision making from some specific externalized perspectives.

Perhaps the most valuable results of a multifaceted phenomenon can be obtained through a mixed-methods approach (Mingers & Brocklesby 1997, Tashakkori & Creswell 2007), either by blending the quantitative and qualitative approaches together or by applying them sequentially. Carelessly used, however, a mixed methodology could lead to a contradictory theoretical framework in which incommensurable worldviews collide (see Campbell 1996). Different methodologies must instead follow the same basic assumption of what reality is and how it can be studied. This ontological and epistemological harmony can be referred to as the concept of coherent pluralism (Jackson 1999). Carefully designed, the mixed models approach (Tashakkori & Teddlie 1998, 16), which includes everything from methods to framework, design, analysis and interpretation, can be regarded as triangulation that improves both the external and internal validity (Modell 2005) of the research entity.

This thesis targets sequential mixed methods by first acquiring a deep qualitative understanding of family forest owners' decision making strategies (I, II) and, secondly, by investigating quantitatively the relevance of some of the observed phenomena (III). This approach is comparable to that of Ingemarson (2004), who first assessed Swedish family forest owners' objectives and motivations qualitatively (Hugosson & Ingemarson 2004), and then used a large survey to validate the results and provide a representative owner typology (Ingemarson et al. 2006). Although the present planning-related thesis provided no country-wide results, it did go one step further by proposing a conceptual model of practical services (IV).

Reliability of the acquired results

Articles I and II can be regarded as case studies. Yin (2003, 54) emphasizes the fact that a case study research is one of the most difficult types of research to carry out. He points out that whereas statistical generalization is inapplicable in case studies, analytical generalization and the logical use of existing theoretical knowledge are essential. Besides, rather than generalize from case study results, it may be better to focus on the transferability of the conclusions (Tashakkori & Teddlie 1998, 65–66). Articles I and II follow this recommendation by discussing the results on the international level and with respect to general societal changes.

According to Wengraf (2001, 193–205) and Yin (2003, 56–59), the basic skills required of a researcher conducting intervention and interviewing are the ability to ask good questions and to be a good listener, adaptability and flexibility, the ability to grasp the issues being studied, and to avoid bias concerning preconceived notions. To ensure the quality of the articles I and II, it was appropriate that the main author, a forest owner himself, conducted and transcribed all the interviews. However, the ability to share the interviewees' perspective and to instill trust in the discussion phase raised the burden of bias in the conceptualization phase. However, this problem was minimized by collaboratively elaborating on the results among peer researchers.

Sampling bias must be taken into consideration when evaluating the generalizability and transferability of the results of articles I and II. The forest owner interviewees were selected from among those owners who ordered a management plan in 2005. This population represents current planning service customers, though not necessarily future customers, because the development of planning services could improve the attractiveness of forest plans among currently passive forest owners. In addition, the younger segment of urban forest owners was poorly represented in the interview sample. It must therefore be stressed that the qualitative results of articles I and II may be biased towards traditional forest owners. Further, even though the fact that the interviewees were selected from two different regions in order to increase the variation between owners, some important phenomena among owners may have escaped discovery. And although little can be said about the shares of observed decision-making modes or other communication-related phenomena among owners, one can argue that the observed phenomena do, in fact, exist and have meaning in owners' decision making, provided that the interpretation process is generally valid.

The subjective effect of selecting one known individual into the interviewee candidate group was reduced by selecting the final group randomly from the candidate group. At the same time an allowance group was randomly selected to substitute for candidates who might refuse. Although sampling bias could not be avoided (Tashakkori & Teddlie 1998, 72–73), it was reduced. The final sample was not considered representative of the future population of planning customers in the whole of Finland. Consequently, the results of articles I and II are discussed on a rather general level in order to avoid false conclusions whereas the more representative results of study III produced more concrete elaboration.

When evaluating the relevance of the results of study III, it must be noted that the responses were given on a 5-point Likert scale, which is essentially an ordinal scale. Göb et al. (2007) have suggested that a reasoned multivariate analysis of such data should use designated ordinal methods or, as Harwell and Gatti (2001) recommend, rescale ordinal data for cardinal use. However, psychometric research has shown that the categorization error present in ordinal data (e.g. Likert scores) does not violate the substantive

interpretations (Johnson & Creech 1983). Since the questionnaire layout in this study was intentionally designed to support the interval scale, the standard cardinal statistical methods were used, and the inferences based on the results can be considered reliable.

In answering the survey, biasing effects such as central tendency (end aversion) bias (Crawford et al. 2000) and acquiescence bias (agree statements as presented) (Ray 1983) can be assumed. Efforts to weaken their effect in this survey, however, include the use of neutral wording, reverse meanings, and different perspectives in statements. Furthermore, non-response phone calls gave no cause to assume any significant effect of different biases. If any segment of family forest owners was missing from the sample, it was passive owners, who are likely to be unreachable by mail surveys. In general, the data can therefore be judged as valid for the purpose stated in the research questions.

Family forest owners' reasoning patterns and the role of decision support

Study III aims to test and quantify the owner groups and decision-making modes which Isokääntä and Tikkanen (2003) and study I described earlier qualitatively. The acquired survey results validate the viewpoints addressed in these studies, but simultaneously offer new relevant knowledge of the co-occurrence of different decision-making attitudes. The mixing of learning, trusting, and decisive attitudes is based on the assumption that the discerned decision-making modes (I) are ideal types that have no pure counterparties in reality, as the original thinking of Max Weber stresses (Eliaeson 2000). Rather, they are analytical tools with which to understand the complex reality. The same argument stands for owner typologies (cf. Boon et al. 2004, 46), however the one in study III being a little bit closer to real owners than were the original modes discerned in article I. As an empirically devised conceptual construct, the typology of owners' decision-support perception (III) essentially informs the designers of communicative planning services about varying attitudes and their expected shares among owners.

Following the lines of thought presented in article I (p. 461), transitions from one group to another are presumable in the course of learning or after changes in an owner's decision-making context (see Fig. 2 in article II, 475). It may well be that in the early phases of ownership (see article I, 455), the owner acts as a trusting learner, and in later phases more like a decisive learner or like a decisive manager. When building schemes for long-lasting customer relationships with family forest owners, these possible development patterns deserve to be taken into account. Alternatively, owners within the same communication-attitude group could express different preferences for communication types or channels depending on their current decision-making environment (e.g. learning and decisiveness could be realized in different ways when discussing in an urban milieu and during forest walks). Such questions remain unanswered in this thesis, however, and could be studied in future.

The prospect theory of Kahneman and Tversky (1979) assumes that in seeking satisfaction and in learning to gain satisfaction, failure increases search and success decreases it (March 1994, 28). The roles of trust, informal communication, and ease as sources of amenity (I, II), however, indicate that this kind of intensive search does not exist among family forest owners in a pure form. Owners tend to seek a satisfactory communication frame (which fits into their current decision-making environment), and after finding one, move on to seeking gain within this limited environment. This can be viewed as a socially and contextually determined bounded rationality.

For instance, a self-active owner chooses the timber buyer or other service provider through a satisficing search or a decision rule favoring socially acceptable (e.g. acquaintanceship, legitimate, and understandable) candidates. S/he then tries to benefit from that frame of service relationship by using an action strategy that resembles maximizing. In other words, owners satisfice at the macro level and maximize at the micro level, which can be interpreted as quasi-maximizing behavior, essentially due to the sentimental values and social networks entangled with their rational reasoning (II). In short, the present results of owners' decision-making strategies underline contextuality as a prerequisite for establishing long-lasting service relationships with owners. Along with creating service schemes for owner–consultant relationships, it may also be beneficial to build and to facilitate owners' networks (see the Belgian example in Van Gossum et al. 2005) within which peer-to-peer learning (Topping 2005) and empowerment (Jones 2001) could occur.

Reaching owner-drivenness in forest planning through adaptation

Adaptive emergence of decision-support needs

When describing forestry decision making, the interviewees usually discussed silviculture (self-active owners in learning mode), timber trading (distant owners in managing mode), management alternatives (owners in ponderous mode), or facts and figures (decisive mode) (I, 458–459). In addition, some owners emphasized field trips while others vividly described their experiences and the potential of computer-aided decision making (II, 470–472; IV, 105). The good advice they received on silvicultural issues made the owners satisfied with the service. However, an economic comparison of the consequences of different forest management alternatives appeared as a type of decision support that the owners have failed to receive, but would find useful.

From the viewpoint of professional forest planners and the administrators of traditional planning systems, the frame of a forest owner's learning experience most often lies in the hands of a planner. In other words, the professional planner makes fundamental decisions according to which the planning process adapts itself. To the owner, such a process may be marketed as a flexible service. However, such flexibility has become a part of institutionalized practices, and therefore of governmentality (Jokinen & Holma 2001). Paradoxically, the lack of diversity in the DSO tray (IV, 96–97) is hidden behind the friendliness of service, which responds well, however, to the owners' desire for communicative learning. It is argued here that current forest planning services in the Finnish context may soon no longer cope with the diversity in owners' evolving desires for communicative decision aid.

To enhance owner-drivenness, smooth learning, and balanced power relations in holding-specific forest planning, it is recommended here to significantly strengthen the role of the owner's choices in orientating the planning process. In particular, objectives of the process, the main sequence of events (cf. Isokääntä & Tikkanen 2003, Hokajärvi et al. 2007b), and the tone of interaction (I, II, III, Cockman et al. 1999) should be released for the forest owner's genuine consideration. Such a change would still leave room for the planner's decisions in the course of planning, relating to the details of the process and application of alternative decision support technologies (IV, 104–106).

Ideally, a socially sustainable planning process would include intensive communication between the owner and the planner, adhering to the interactive rather than the persuasive mode of communicative intervention (Leeuwis 2004, 35 & 55–56). This ideal would presumably free such communication from distortions related to mistrust, illegitimacy, and incomprehension found in article II (Figure 1, p. 471). Such a planning process would include intensive communication between the owner and the planner, and would appreciate the agreed-upon mutual roles or participants, where the owner holds the power to take initiatives (defined above as owner-drivenness). This ideal model promises to make it easier for the forest planner to help the forest owner to solve important and topical decision problems in his/her ownership. It would also leave space for the forest owner's social desires and self-control, which would therefore conform to the perspective of social sustainability, which represents one of the fundamental assumptions of this thesis.

Figure 2 shows a summarized conceptualization of the factors that, based on the theoretical perspectives and empirical results of studies I–IV, contribute to an owner's needs for decision aid. The ownership strategy (OS) represents socially mediated cognitive structures (see also Hugosson & Ingemarson 2004), and the decision-making environment (DME) represents the current circumstances under which ownership is being practiced (see also Lönnstedt & Törnqvist 1990, Bohnet 2008). The combination of OS and DME is relative to the concept of the task environment (Newell & Simon 1972), comprising external factors and internal mental models. This thesis concentrates on the interplay between OS and DME, realized as decision-making modes and decision aid needs as adaptive responses to topical decision problems. It is worth noting that the components of DME and contextual consultancy affordances (Gibson 1986) in particular, together with past experiences, may play a crucial role in evoking perceptions of forestry communication. In other words, it is assumed that available communication options and the supply of services to some extent generate demand and desires for communication among family forest owners.

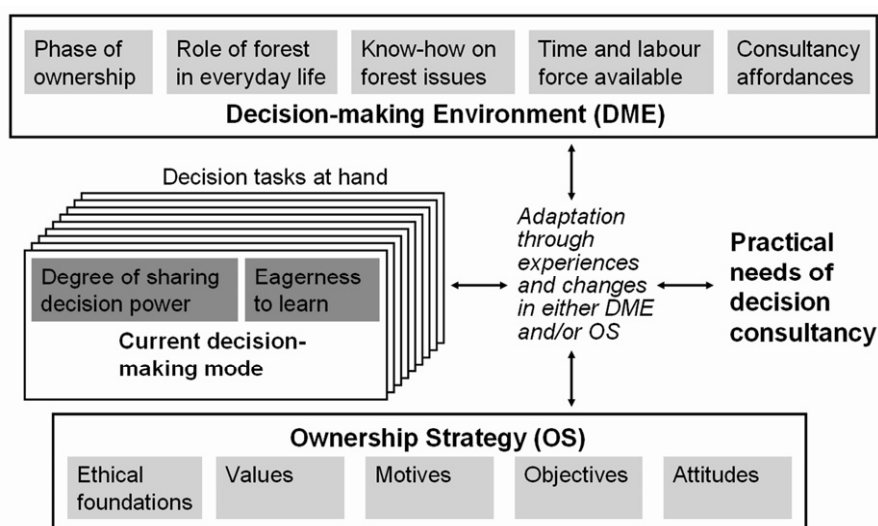


Figure 2. The family forest owner's decision-making environment, ownership strategy, and adaptation realized as needs for decision consultancy.

Learning organization as a comprehensive basis for a stable change

An adaptive organization is capable of modifying the service tray according to feedback assimilated through individual processes. Such adaptation is thus realized as organizational flexibility. It fails, however, without a deliberate and properly functioning feedback system within the organization (see article IV, Fig. 1, p. 97). In the case of forest planning, the degree to which the framing objectives of planning activity (owner-drivenness, serving diverse needs) can actually guide the enhancement of the planning service tray through the feedback system will be crucial to the success of the organizational adaptation.

Reflectivity can transform the planning institution into a learning organization (Argyris & Schön 1978, Senge 2006). There, a new concept of decision support in holding-specific forest planning can emerge, hence the inner capability of rethinking the existence and activities of the organization (cf. Leeuwis 2004). In this mode of adaptation, even holistic flexibility is insufficient: a revolutionary new setting for organizing activities is called for. In the case of forest planning, forest plans sold to family forest owners could be reconceived as communicative owner-driven decision-support services, and the entire organization could be renewed according to that updated self-view. It is worth noting that such an adaptation process requires time, because it affects the entire organizational culture. Besides, rethinking the organizational endeavor inevitably leads to interplay between other organizations and institutions, resulting in inter-organizational learning (Mäntysalo 2000, 373–375). Such comprehensive processes of change can be consulted with the aid of activity theory, an expansive learning approach, and related developmental work research (Engeström 1987, 2001, 2005). Such an endeavor into collaborative change would then result in a new activity concept (Virkkunen 2007) in a socially and culturally sustainable way.

Directions for further research

The interviewees in articles I and II were all real customers of forest planning conducted by regional forestry centres and, thus, should be regarded as essentially amenable to accepting current planning procedures. In order to improve the effectiveness and acceptability of forest planning as owner-driven decision support, we should also be interested in those owners who, for one reason or another, have been unwilling to order a forest plan. With the data currently at hand, we cannot directly deduce how their wishes could be satisfied or what kind of planning they would be interested in. One can, however, argue that by better satisfying the needs of current planning customers, a number of new customers could also develop an interest in planning services. Learning more about this will require feedback monitoring with a particular focus on first-time experiences with the renewed planning services.

Adding to the results of study III, some specific owner types may be interesting targets for further investigations relating to their decision-support needs. At least the smallest-scale forest owners (holding size under ten hectares), holdings with joint ownerships, passive forest owners, and absentee first-generation owners (who, unlike their parents, lack childhood forestry experience) could prove interesting research topics in the future. As article II suggests, decision aid schemes in the urban–rural continuum would include

relevant research and development topics by means of social network analyses (Scott 2000), for example, and developmental work research (Engeström 2005).

The features of decision support services, which would be developed to serve the decision-making modes and owner groups identified in studies I and III, could be tested among owners in focus group discussions. Owners' reactions to the DSOs presented in article IV could be of help in modifying service recommendations towards greater owner-drivenness and better applicability in practice. After that, more accurate and generalizable estimates of the demand potential for various services could be obtained with a choice experiment survey, which could include variables such as tone of interaction (as in article I), communication intensity, interaction milieu (forest, home, or both), and price as well as the form and content of the final product.

From a forest policy perspective, exploring connections between the communication-motivation-based owner typology (study III) and the ownership-motivation-based (e.g. Kendra & Hull 2005, Ingemarson et al. 2006) or value-based (Karppinen 1998) owner types could prove beneficial. The results would inform policy-makers and practitioners to construct communicative planning and extension service alternatives where the aggregate of the form and content correspond to the motivations of the observed owner segments.

Deane (2004, 163–165) has suggested that forest owner researchers should avoid the predominantly mechanistic worldview, and diversify their theoretical and discursive practice. Thus, there is a need to make deliberate choices when conducting research with [*sic*] family forest owners. For forest planning research, a phronetic approach (Flyvbjerg 2001 & 2004) could represent an appropriate framework, as it justifies approaching real situations when investigating family forest owners' actual decision making and true support needs. On the first level, this calls for conducting interviews about actual situations instead of general opinions, and directly observing actual behavior on the following level (e.g. Bergeå 2007). In such a research endeavor, the role of the researcher is to perform contextual research, to consult the practitioners, and to participate in enhancing the social design of the practices in question (cf. Simon 1996, 166). Following such a line of inquiry by means of design-based research (Joseph 2004), for example, would be equivalent to approaching a new theoretical perspective on researching family forest owners. In conclusion, this thesis encourages researchers and practitioners collaboratively to adopt this view in the near future, since "practice is the best theory".

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